Abstract

Force method of analysis has lost its edge to displacement based methods with the use of computers for structural analysis This is due to difficulties in selecting proper set of redundants for a given problem However there has been a revival of interest in the force methods with the hope that it may be made competitive for a limited but important class of problems

The Integrated Force Method (IFM) is independent of redundants in the structure and hence it is amenable to automation In IFM all the internal forces in the structure are considered as primal variables which satisfy the equilibrium equations and compatibility conditions simultaneously Already a number of investigations are carried to develop different elements and their use to typical problems of structural analysis

The present studies are focused on the application of IFM for analysis of structures with geometric nonlinear behavior A formulation is proposed for geometrically nonlinear problem using IFM based on the total Lagrangian approach and the nonlinear equilibrium equations are derived An algorithm based on Incremental Iterative method is employed to solve the nonlinear equilibrium equations Application is made to highly nonlinear beam type of problems including Williams Toggle frame, cantilever with end moment and portal frame The results are compared with those obtained by displacement method Results indicate that IFM is equally capable of performing nonlinear analysis of structures similar to displacement method